1,104,884

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,104,884

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SEE ERRATA SLIP ATTACHED

COMPLETE SPECIFICATION

Method of and Apparatus for Dividing Lengths of Spring Unit for use in Mattresses and the like

We, MULTILASTIC LIMITED, a British Company, of 134 High Street, Brierley Hill, Staffordshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of and apparatus for dividing lengths of spring unit for use in mattresses, seats, cushions and the like.

The invention is particularly concerned with dividing lengths of spring unit of a known kind which comprises a plurality of bands of wire springs, which bands are disposed side-by-side, and a plurality of helical wires, parallel with one another, extending transversely of the bands and linked to the bands, the length of spring unit having two parallel main faces formed by the edge faces of the bands, the helical wires being spaced apart along the unit, and successive helical wires along the bands of springs being at alternate main faces of the spring unit, and each band of wire springs comprising a length of resilient wire bent to form both a plurality of coil springs, disposed side-by-side in a row, and a plurality of connectors, each connector serving to interconnect two adjacent springs in the row, extending lengthwise of the row and being at an edge face of the row, the connectors extending between successive helical wires at each main face.

Spring units of this kind are described in Austrian Patent No. 206,147 in the name Willi Gerstorfer.

It is the usual practice to secure a spring unit, whether of this type or of any other type, to peripheral frames or supports, and in general it is desirable to arrange for the planes of the sides and ends of the unit to be normal to the planes containing the main faces of the unit. It will be appreciated that the sides of a unit of the type described can readily be attached to frames or supports as the unit includes wires which are in or near the main top and bottom planes of the unit and are at the sides of the unit. Some difficulty may arise, however, at the ends of the unit, and it is the object of the invention to overcome this difficulty.

According to the present invention there is provided a method of dividing a length of spring unit transversely, the spring unit being of the kind specified, the method consisting of the following steps taken not necessarily in the following order, the step of arranging for one of the helical wires to be absent from one main face of the unit, the step of lengthening those connectors at the other main face which are opposite the place from which the helical wire is absent by bending the wires integrally connected to the ends of such connectors, the step of severing each of these connectors at a point directly opposite the place from which the helical wire is absent, and the step of bending the wire on each side of the severance point to form an attachment anchorage transverse to the band to which it is integrally connected and directly opposite the place from which the helical wire is absent.

With the aid of the present invention it is possible to provide units, with ends suitable for attachment to frames or supports, by dividing a length of spring unit and not wasting any material from this length at the plane of division.

Division of a length of spring unit may be effected manually. A helical wire is omitted or removed and the connectors opposite the place where the helical wire was omitted or removed are snipped in half. If the springs on either side of the division were coupled together they are uncoupled

[1

from one another, and the divided units are separated. The end of each half-connector in turn is gripped with pliers or the like and pulled so that the half-connector is lengthened, the wire extending from the half-connector being bent into alignment with the half-connector; and finally the end portion of the half-connector is bent at right-angles to the adjacent part thereof to form an attachment anchorage.

The invention also consists in a spring unit divided from a length of spring unit by the method outlined above.

The invention also consists in apparatus, for use in carrying out the method outlined above, comprising a plurality of devices, one for each band, each device having a pair of bearers adapted to be moved apart relatively to each other and to engage relatively straight end portions of the springs integrally joined to the connector to be severed and to force them apart thus causing wire to be transferred from these end portions to the connector, and means for bending the transferred wire into substantial alignment with the connector.

The invention will now be more particularly described with reference to the accompanying drawings, in which:—

Figure 1 is a somewhat diagrammatic perspective view of a short length of wire spring band from which spring units of the kind specified can be made,

Figure 2 is a somewhat diagrammatic plan view of a corner of a spring unit and frames, the spring unit having been formed from a length of spring unit by the method which is the subject of the present invention,

Figure 3 is a somewhat diagrammatic side view of a corner of a spring unit and frames, the unit being similar to that shown in Figure 2 but incorporating a slight modification,

Figure 4 is a diagram illustrating the shape of a connector before and after it has been lengthened,

Figure 5 is a diagram illustrating the final shape of the connector shown in Figure 4,

Figure 6 is a plan view of one form of apparatus for carrying out the method which is the subject of the present invention,

Figure 7 is a section on the line 7-7 of Figure 6, and

Figure 8 is a section on the line 8-8 of Figure 7.

The invention concerns the division of lengths of spring unit of a known kind. One particular form of spring unit is made from bands of wire springs, the bands all being similar to one another. Part of one band is shown in Figure 1. The band is formed from a single length of resilient wire bent to form a plurality of coil springs 10, disposed side-by-side in a row, and a plurality of connectors 11, each connector serving to interconnect two adjacent springs in the row. The connectors 11 extend lengthwise of the row and are disposed at the top and bottom edge faces of the band. In the assembled spring unit the band is linked to other similar bands by helical wires parallel with each other and extending transversely of the bands. The helical wires are not shown in Figure 1 but, when present, link the end portions 12 of the springs which are integrally joined to the connectors 11. The helical wires are thus spaced apart along the band and successive helical wires along the band are at alternate edges of the band. Further, the connectors 11 extend between successive helical wires at each edge face of the band.

These features are common to the bands of all spring units which can be divided by the method which is the subject of the invention. The particular form of band shown in Figure 1 has certain preferred features, namely that successive springs 10 are alternately left and right handed and that each spring 10 is coupled to the next by having one turn passed round the adjacent turn in the spring to one side of it.

A corner of a spring unit incorporating bands of a kind similar to that shown in Figure 1 is shown in Figure 2, though here the springs are not coupled together. In Figure 3, which is a side view of a unit similar to that shown in Figure 2 the springs are coupled together.

In Figures 2 and 3 the bands have the same reference numerals as are given to the band in Figure 1. The bands are linked by helical wires 13 arranged as described above. Each helical wire is of relatively small pitch and diameter. Each helical wire 13, in addition to linking neighbouring bands, also links the end portions 12 of adjacent springs in each band, which end portions are substantially straight, and extend transversely across the edge face of the band of which they form a part.

A length of spring unit is usually made of indefinite extent from a plurality of relatively long bands of wire springs, the bands being linked together by helical wires successively applied. When dividing a length of spring unit by the method in accordance with the invention one of the helical wires 13 is omitted during manufacture or is subsequently removed. The connectors 11 opposite the place from which the helical wire is absent are severed at their middles, and the springs on either side of the severed connectors are uncoupled, if they were previously coupled. A study of Figures 1 to 3 will show that in the plane of that main face of the divided spring units containing the severed connectors there are no wires at the ends of the units obviously suitable for connection to a frame or support. In accordance with the invention the

connectors are lengthened before or after they are severed, and the end portions of the severed connectors are bent to form anchorages which can be attached to a frame or support. The connectors are lengthened by pulling additional wire from the springs to which they are joined and bending the additional wire into line with the connectors. Although this reduces the size of the springs from which wire is pulled the proportional reduction in the size of the springs is so small as to be negligible.

A typical method is illustrated in Figures 4 and 5. In Figure 4 there is shown a connector 20 joined to the substantially straight end portions 21 of two springs (not shown). The connector 20 is lengthened at the expense of the end portions 21, the shape of the lengthened connector and shortened end portions being indicated at 22 and 23 in Figure 4. Before or after being lengthened the connector is severed at its middle and the portions adjacent to the newly formed ends are bent as shown in Figure 5 to form attachment anchorages. Each anchorage comprises a part 24 extending transversely to the band of which it forms a part, and a terminal part 25 which constitutes a stop.

In use the spring unit is provided with two peripheral frames, 26 and 27 as shown in Figures 2 and 3, the frames lying in the planes of the main faces of the unit. The frames are connected to the unit by short strips of metal 28 each wrapped around the frame and an adjacent part of the unit. At the ends of the unit the lower frame 26 is connected to the end portions of the springs while the upper frame 27 is connected to the parts 24 of the anchorages, the terminal parts 25 preventing the anchorages slipping from the strips 28.

It will be appreciated that if the connectors concerned were not lengthened and if their free ends were bent those free ends could not lie in the end plane of the unit. Further, if the connectors were not lengthened and were severed not at their middles but at places such that sufficient wire could be left on one of the ends of wire to enable attachment anchorages to be formed at the end of the unit the short ends of wire on the other unit would be useless and a further division of the length of unit, with consequent wastage of a short piece of the length, including at least one spring on each band, would be necessary.

Although the method may be effected manually it is preferably effected by mechanical means. Apparatus suitable for effecting the method is illustrated in Figures 6 to 8. The apparatus serves to lengthen the connectors, sever them and form attachment anchorages.

Each connector concerned is cut and bent by a separate device, and as all the devices are similar to one another only one is described and illustrated in detail. The device comprises a stationary stand 29 with a pair of bearers 30 adapted to be inserted between the two relatively straight end portions 21 of adjacent springs. The bearers 30 are arranged to be pushed apart from each other, sliding on the stand 29, and when they are pushed apart the wire is withdrawn from the straight end portions 21, and the connector 20 is lengthened. As it moves outwards each bearer 30 engages one arm 31 of a bell-crank pivoted at 32 to the stand 29 and the other arm 33 is arranged to apply pressure to the end of the connector 20 adjacent to the bearer 30, but on the other side of the connector from the bearer. This pressure deforms the wire so as to bring the parts withdrawn from the straight portions 21 into alignment with the remainder of the connector 20. The device also includes two jaws 34 and 35 so shaped that they can sever and bend the connector 20. The jaws are disposed one on each side of the connector 20, at the middle thereof, and each of the jaws 34 and 35 is independently movable to and fro along a line normal to the middle of the connector 20. Each jaw includes a cutter, which conveniently comprises a standard cutter tool, the first jaw 34, having a cutter 36, and the second jaw 35, having a cutter 37. Each cutter is mounted between a pair of cheeks. The edge of the cutter 36 projects from its cheeks 38, but that of the cutter 37 is recessed between its cheeks 39. In use the first cutter 36 moves towards the second 37, which is stationary, and the first cutter 36, bends the wire between the spaced cheeks 39 of the second jaw 35, and then cuts the wire against the second cutter 37. The two cutters 36 and 37 may be aligned so that their cutting edges meet edge to edge but in a preferred arrangement they are very slightly offset. The initial shape of the connector 20 is indicated in full lines, and the shape of the central portion thereof, just before it is severed is indicated by the dotted lines 40. In order to enable the connector to bend in this way the bearers 30 are released so that they can be moved towards each other by the end portions 21 of the springs. After the wire is cut the second jaw 35 withdraws from the wire and the first jaw 34 continues its movement. In due course the cheeks 38 of the first jaw 34 engage the wire and bend it at points spaced from the initial bends, against two fixed abutments 41 which are on the same side of the wire as the second jaw 35, the cheeks 38 of the first jaw 34 entering between the abutments 41. The final shape of the severed parts of the connector is indicated by the chain-dotted lines 42, and correspond to those shown in Figure 5.

The devices are operated by three parallel

bars 43, 44 and 45 extending along the row of devices and slidable in a slot in each stand 29. Each bar is slidable lengthwise and its movement is effected by hydraulic or pneumatic means not shown. The lowermost bar 43, is provided with laterally projecting cams 46 of saw-tooth shape which in use act to urge arms 47 apart. Each arm is pivoted at one end 48 to the stand 29 and the other end 49 of the arm is connected by a pin-and-slot connection to one of the bearers 30. The cams 46 engage projections 50 at intermediate positions along the lengths of the arms. The first jaws 34 are mounted on the middle bar 44, and the second jaws 35 on the top bar 45.

WHAT WE CLAIM IS :—

1. A method of dividing a length of spring unit transversely, the spring unit comprising a plurality of bands of wire springs, which bands are disposed side-by-side and a plurality of helical wires parallel with one another, extending transversely of the bands and linked with the bands, the length of spring unit having two parallel main faces formed by the edge faces of the bands, the helical wires being spaced apart along the unit and successive helical wires along the bands of springs being at alternate main faces of the spring unit, and each band of wire springs comprising a length of resilient wire bent to form both a plurality of coil springs, disposed side-by-side in a row, and a plurality of connectors, each connector serving to interconnect two adjacent springs in the row, extending lengthwise of the row and being at an edge face of the row, the connectors extending between successive helical wires at each main face, the method consisting of the following steps taken not necessarily in the following order, the step of arranging for one of the helical wires to be absent from one main face of the unit, the step of lengthening those connectors at the other main face which are opposite the place from which the helical wire is absent by bending the wires integrally connected to the ends of such connectors, the step of severing each of these connectors at a point directly opposite the place from which the helical wire is absent, and the step of bending the wire on each side of the severance point to form an attachment anchorage transverse to the band to which it is integrally connected and directly opposite the place from which the helical wire is absent.

2. A method according to Claim 1 in which the step of arranging for one of the helical wires to be absent is effected by omitting a helical wire during the manufacture of the length of spring unit.

3. A method according to Claim 1 in which the step of arranging for one of the helical wires to be absent is effected by removing a helical wire from the length of spring unit.

4. A method according to Claim 1 in which the part of each length of wire at each end of each connector forms a bend leading to a relatively straight portion transverse to the band formed from the length of wire, and in which the step of lengthening the connectors to be severed is effected, before these connectors are severed, by forcing apart the two said relatively straight portions connected to each of these connectors and deforming the wire so that the two associated bends are straightened and are replaced by two new bends further so that they are further apart than the original bends.

5. A method of dividing transversely a length of spring unit of the kind specified, substantially as hereinbefore described with reference to and as illustrated by Figures 4 and 5 of the accompanying drawings.

6. A spring unit divided from a length of spring unit by the method claimed in any of the preceding claims.

7. A spring unit according to Claim 6 and substantially as hereinbefore described with reference to and as illustrated in Figure 2 or Figure 3 of the accompanying drawings.

8. Apparatus for use in carrying out the method claimed in any of Claims 1 to 5, comprising a plurality of devices, one for each band, each device having a pair of bearers adapted to be moved apart relatively to each other and to engage relatively straight end portions of the springs integrally joined to the connector to be severed and to force them apart thus causing wire to be transferred from these end portions to the connector, and means for bending the transferred wire into substantial alignment with the connector.

9. Apparatus according to Claim 8 in which each device also comprises two relatively movable cutters adapted to sever the connector at its middle, the cutters being mounted on jaws having cheeks which engage the connector between them and bend the wire to form at least part of the attachment anchorage.

10. Apparatus according to Claim 8 in which there are a pair of longitudinally movable bars, one cutter being mounted on one bar and the other cutter being mounted on the other bar, and the corresponding cutters of the other devices also being mounted in the same manner on the same two bars, and means for moving the bars longitudinally.

11. Apparatus according to Claim 8 and substantially as hereinbefore described with reference to and as shown in Figures 6 to 8 of the accompanying drawings.

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3 SHEETS

COMPLETE SPECIFICATION

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SHEET 1

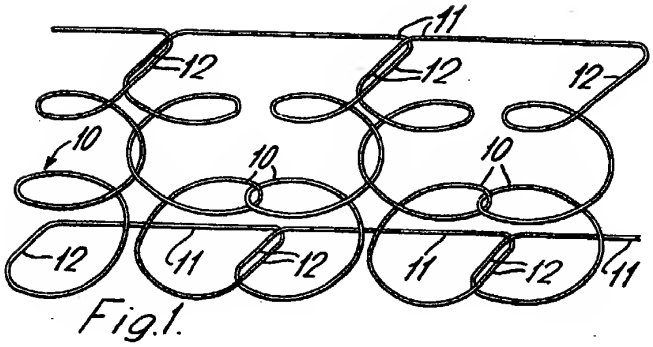


Fig.1.

Fig.2.

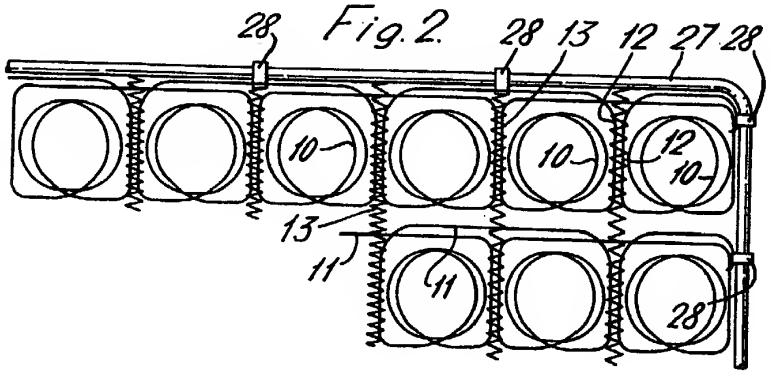


Fig.3.

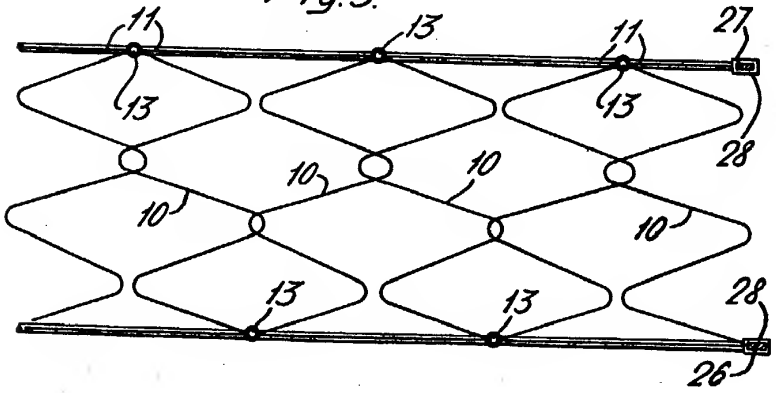


Fig. 4.

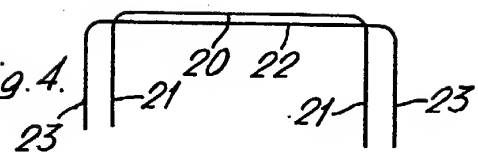


Fig. 5.

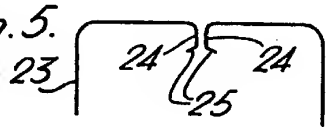
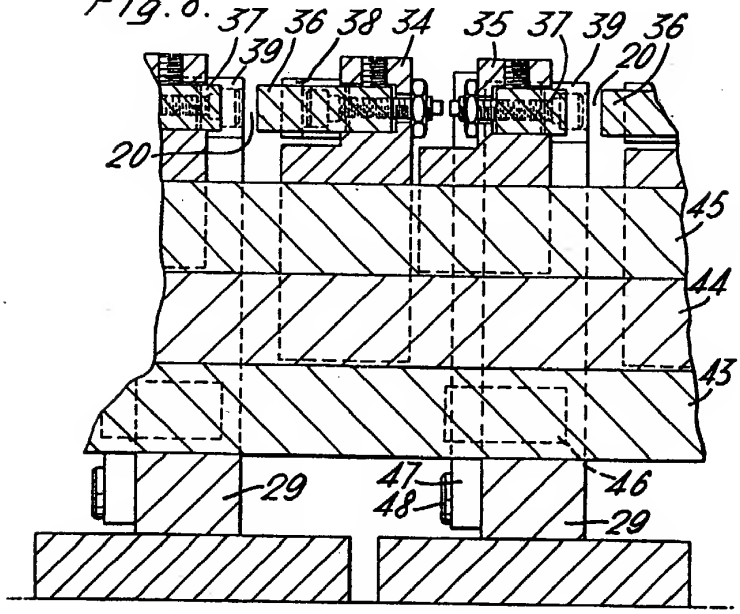


Fig. 8.



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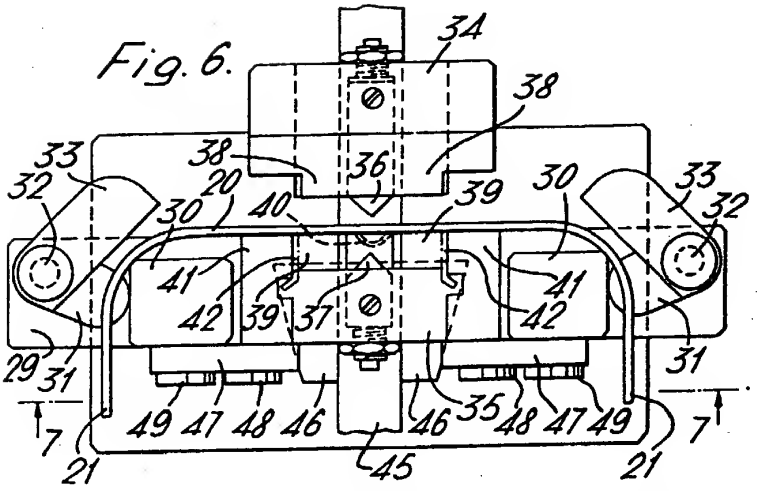
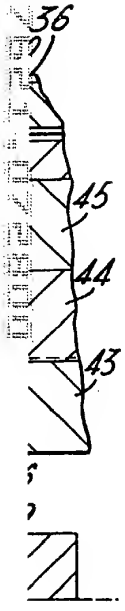
SHEETS 2 & 3

Fig. 6.





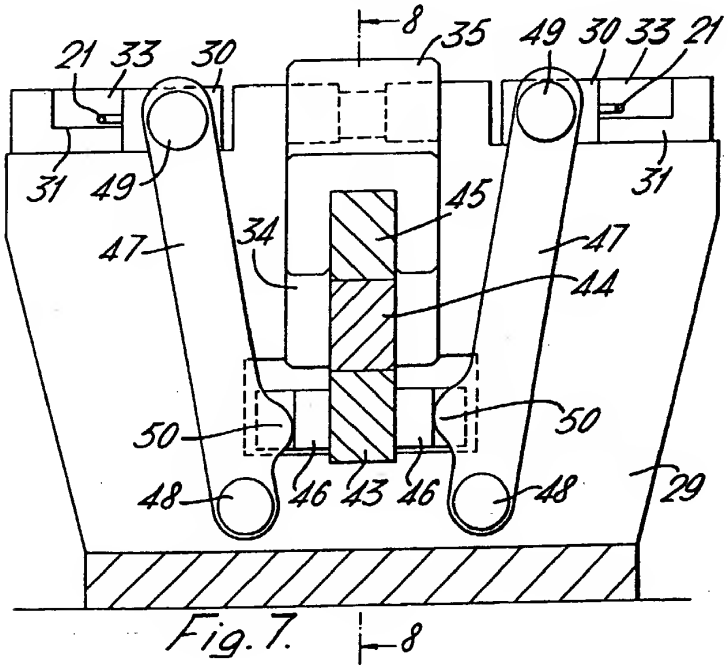


Fig. 7.

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SHEETS 2 & 3

Fig. 4.

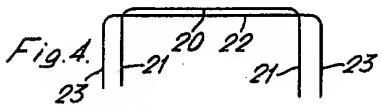


Fig. 5.

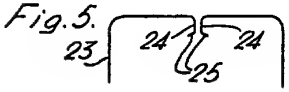


Fig. 6.

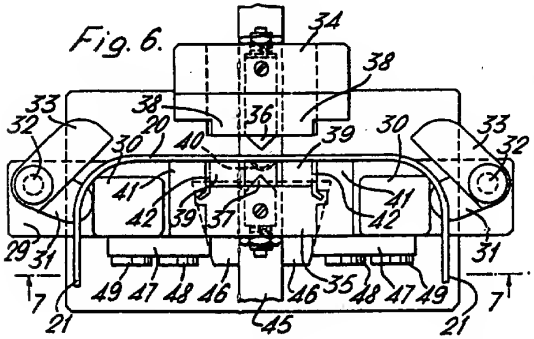
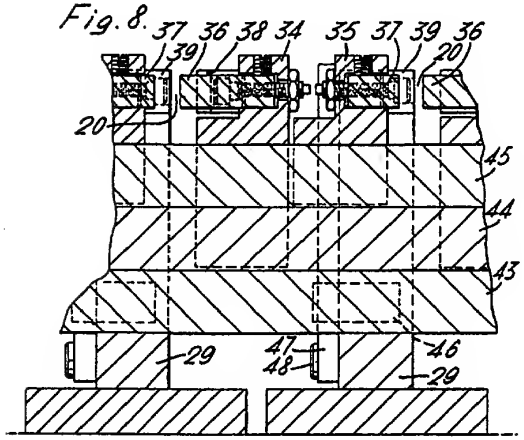


Fig. 8.



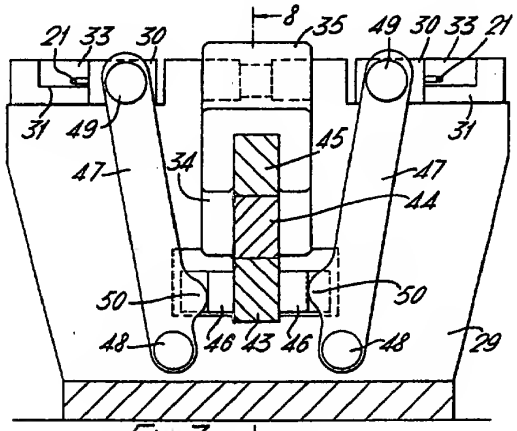


Fig. 7.